

hours, and the latter in twenty-one and a half; so that the squares of their periodical times are very near in the same proportion with the cubes of their distances from the centre of Mars, which evidently shows them to be governed by the same law of gravitation that influences the other heavenly bodies." This idea of Swift's, which appears to have only recently come to the knowledge of Prof. v. Oppolzer, is so singular a one taken in connection with the facts of the discovery of the satellites of Mars, that it is not surprising the editor of the *Astronomische Nachrichten* should have transferred it to his columns. Possibly the opinion which has prevailed largely amongst astronomers that, if satellites of Mars existed, they must be very small and close to his disc, may have had originally some connection with Swift's fancy.

BIOLOGICAL NOTES

PAPUAN PLANTS.—In the Appendix to Baron von Mueller's "Descriptive Notes on Papuan Plants," which we have just received we find some interesting additions to orders already considered, and which we have had occasion to refer to before. In Leguminosæ, *Acacia holosericea* is recorded from Geelvink Bay, found by Beccari; from the Fly River, by D'Albertis; and Baxter's River, by Reedy. In Myrtaceæ are four additions—*Tristania macrosperma*, *Myrtella beccarii*, *M. hirsutula*, and *Baeckea frutescens*. A remarkable myrtaceous plant, with the habit of a *Psidium*, is stated to be contained in Dr. Beccari's collection, which Baron Mueller thinks is probably referable to the genus *Eugenia*. The only flower available for examination had eight petals, being double the number of the calyx lobes. Unless this augmentation arose from monstrous growth we are reminded that we have here a species abnormal not only in the genus *Eugenia* (and to which the name of *E. pleiopetalia* might be given), but also in the whole order of Myrtaceæ, except *Gustavia*. From Mount Arfak, at an elevation of about 6,000 feet Dr. Beccari obtained the first epacridaceous plant recorded from New Guinea, though in all likelihood others will yet be detected in the higher mountain regions.

HORSE-SHOE CRABS.—With reference to the fact that large numbers of trilobites are found on their back, and the inference that when living they probably swam in this position, Mr. Alex. Agassiz states (*Silliman's Journal*) that he has for several summers kept young Limuli (horse-shoe crabs) in his jars, and has noticed that besides often swimming on their backs, they will remain in a similar position for hours, perfectly quiet, at the bottom. When they cast their skin it invariably keeps the same attitude on the bottom of the jar. It is not uncommon to find on the shores, where Limuli abounds, hundreds of skins thrown up and left dry by the tide, most of which are turned on their backs. Again, young Limuli generally turn on their back while feeding. Moving at an angle with the bottom, the hind extremity raised, they throw out their feet beyond the anterior edge of the carapace, browsing, as it were, on what they find in their road, and whisking away what they do not need by means of a powerful current produced by their abdominal appendages.

GREEN ALGÆ.—Our knowledge of the life-history of those green-coloured algae which seem to possess a true reproductive system, is progressing with rapid strides, and in the *Botanische Zeitung* for October and November last two most remarkable papers on two well known (so far as external form goes) species have very considerably advanced our knowledge of the group. The earlier in date (October) of these two memoirs is by the well-known botanists Rostafinski and Woronin on *Botrydium granulatum*. This alga was described by Ray nearly 200 years ago, and is probably known to many as growing up in damp clayey spots, and presenting the appearance of bright

green blobs about the size of large mustard seeds. Common as this plant is, it is only now that after several years' consecutive watching the authors have been able to clear up the mystery of its life, and to determine that the formation of ordinary zoospores can eventuate in the four following ways (a) from the vegetative plant, (b) from an ordinary zoosporangium, (c) from the root-cells, and (d) from a Hypnosporangium: and as still further means of increase we have (e) cell division, (f) formation of spores, and (g) formation of isospores. Botrydium would also seem to enjoy a five-fold resting state: 1. The asexual aquatic zoospores with a quiescence of one month. 2. The root-cells, quiescence the year through in which they are formed. 3. The hypnosporangia, quiescence the same. 4. The spores, quiescence a year. 5. The isospores, quiescence at least over the year in which they were formed. The next memoir is a joint one by A. de Bary, the able editor of the journal, and E. Strasburger, and is about that very beautiful green seaweed not uncommon in the Mediterranean, called *Acetabularia mediterranea*. This genus was so called by Lamouroux on account of the saucer (acetabulum) like form assumed by the little rows of filaments that crown the cylindrical stalks. There are three species known, perhaps they may be all varieties of the one now referred to. Prof. de Bary was only enabled to watch the progress of the spore development to a certain stage, but by Strasburger's researches, carried on at Spezia, we are enabled to read the whole history and to know that the motile bodies of protoplasm set free from a mother-cell, can and do conjugate, forming a resting body which can and does vegetate. At the close of this memoir Strasburger proposes that we should call the body formed by the conjugation of the contents of two cells (Gametæ) by the name of Zygote, and that those plants whose Gametæ are active might be called Planogameta, and those where (as in Desmids) the Gameta are at least quasipassive, might be called Aplanogameta.

DEEP SEA ASCIDIANS.—Mr. H. N. Moseley has published (*Transactions*, Linnean Soc. S.S. Zool., vol. 1) a description, accompanied by excellent figures, of two very remarkable forms of ascidians. The first described was obtained from the great depth of 2,900 fathoms in the North Pacific Ocean, and is called *Hypobrythius calycode* in allusion to its occurrence at so vast a depth and to its cup-like form. Its outer skin is hyaline and extremely transparent, but in certain places it is strengthened by the presence of tough cartilaginous plates, and these are arranged in a nearly symmetrical manner. It is attached by means of a stalk. It is probably allied to the genus *Boltenia*, but is abundantly distinct from all known forms. The second is a beautiful stellate form taken 1070 fathoms, not far from one of the Schouten Islands. From its having eight long radiating processes it was at first taken for a medusoid form. Its test is hyaline and gelatinous and it is also an attached form, but the stalk is short. The respiratory sac is flattened out so as to become nearly horizontal, and there is no gill net-work present. It has been called *Octacnemus bythius*.

THE BYSSUS IN THE MUSSEL.—Tycho Tulberg has published in the *Transactions* of the Royal Society of Natural History of Upsala (July, 1877) an account of the structure of the byssus-forming gland in *Mytilus edulis*. The strong silky threads formed by this gland, which moor the mussel shell so firmly to its resting-place, must be familiar to most. In an allied genus (*Pinna*) these threads have been even spun and formed into gloves. The manner in which the tongue-like foot can affix these threads is easily to be seen by watching a small specimen of the common mussel when in a healthy condition and confined in a glass jar. The minute structure of the gland that secretes the threads is well described by Mr. Tulberg, who promises further to publish an account of

the structure of this organ in some other species of byssus-forming bivalves.

AQUATIC RESPIRATION.—Some experiments on the breathing of aquatic animals (both fresh and salt water) have been recently described by MM. Jolyet and Regnard in the *Archives de Physiologie*. The results are briefly as follows:—These animals, living in a medium very poor in oxygen, and having a blood-liquid with small respiratory capacity, have the least vigorous respiration. In the free natural act of respiration the oxygen which disappears is not exactly represented by the oxygen in the carbonic acid produced; the ratio $\frac{CO_2}{O}$ is always less than 1; i.e., aquatic animals, in the normal state, never give off more carbonic acid than the oxygen they absorb. (The opposite result got by some physiologists is attributed to keeping the animals in an enclosed medium whose oxygen they gradually exhausted.) As with other animals, heat-variations in the surrounding medium has a marked influence on the chemical phenomena of respiration. Taking 2° and 30° as the limits of bearable external temperature, the quantities of the absorbed oxygen vary (other conditions being equal) in the ratio of 1 to 10. Among other causes which may have an influence on the vigour of breathing (apart from those connected with species) the most important, after temperature, are the state of hunger and digestion, the amount, and the greater or less intensity of muscular action. In the experiments there was sometimes a slight development of nitrogen, sometimes an absorption. No definite opinion could be expressed with reference to this point.

GEOGRAPHICAL NOTES

EXPLORING COLONIES.—The Société des Colons Explorateurs, lately organised in Paris, is developing a most healthful degree of activity. Its purpose is to organise a systematic method of exploration and colonisation, based on the same principles as those which animate the newly-founded international society for the exploration and civilisation of Africa, but embracing in its field all the undeveloped portions of the globe. The Society has formed two councils to direct its operations. In the first, which is charged with the scientific, geographical, and exploratory sections, we notice the names of Malte-Brun, de Lesseps, de Quatrefages, Milne-Edwards, Admiral La Roncière le Noury, &c. The second, devoted more especially to agriculture, commerce, and industry, embraces Michael Chevalier, Tisserand, Col. Solignac, F. Garnier, and other well-known names. The plan adopted by the Society for the attainment of its objects is eminently practical. A colony is formed from representatives of various classes and occupations, who are well fitted to investigate and develop the resources of a new country; it is provided with a complete equipment, and despatched to a promising locality. Here a firm foothold is established, and the new settlement made, as soon as possible, not only self-supporting, but a centre for geographical and general scientific investigation. The band of permanent colonists are accompanied by a certain number, who, after obtaining a degree of familiarity with the difficulties to be overcome in a new settlement, are ready to form the nucleus of a new colony. In this manner not only will the various colonies increase the sphere of their activities at a rapid rate, but drill at the same time groups of hardy explorers well fitted to extend the circle of the Society's undertakings. The first experimental colony has already been started on the coast of Sumatra, and embraces in its *personnel* graduates of the leading technical and professional schools of Paris. If this simple practical programme is carried out successfully, it is evident that the new Society, increasing the extent of its operations in arithmetical progression, will

soon become a most important factor in the slow process of civilising the world.

SUMATRA.—In the January session of the Dutch Geographical Society it was announced that Lieut. Cornelissen had been appointed to take charge of the Sumatra exploring expedition, lately deprived by death of its commander, M. Schow-Sandvoort. He leaves in March to assume the direction of the explorations. During the past three months 14,000 guilders have been contributed for the Sumatra exploring fund.

NIAS ISLAND.—In Petermann's *Mittheilungen* for February is a very full account, with map, of the Island of Nias, on the west of Sumatra, by Dr. A. Schreiber. The island now belongs to the Dutch, and by them has in recent years been pretty thoroughly explored. The island is hilly, the highest summit being 2,000 feet, the formation being mostly sandstone and coral.

ARCTIC EXPLORATION.—Admiral La Roncière le Noury in his capacity of president of the Paris Geographical Society, M. Quatrefages, and M. Maunoir, general secretary, have written an official letter to Capt. Howgate, U.S.A., conveying to him their approbation of his scheme for establishing a polar colony in Lady Franklin Bay. They trust this document may induce the Congress to vote the required credit for starting the contemplated expedition. They express, moreover, their gratitude for the sending out of Capt. Tyson's preliminary expedition, and they trust Capt. Howgate will soon be in a position to take advantage of the means which his hardy lieutenant has been sent to collect. Capt. Howgate has written to the Danish Government, asking them to send instructions to the Disco authorities, authorising them to place the Government storehouse at the disposal of Capt. Tyson, if he has failed in collecting a sufficient number of furs during the present winter season. Mr. S. R. Van Campen has been asked by the Hon. B. A. Willis, of the Committee on Naval Affairs in the United States Congress for a report on the Arctic expeditions abroad, and has complied with the request. Besides speaking particularly of the proposed expeditions of Holland and Sweden, Mr. Van Campen suggests to the Committee, as it has in charge the bill now before Congress for an American expedition, proposed in accordance with Capt. Howgate's scheme, the incorporation of a clause granting rewards upon a graduated scale to individual explorers of whatever nationality, who may reach latitudes or make discoveries in Arctic territory beyond points hitherto attained.

ROHLFS' EXPEDITION.—Herr Gerhard Rohlfs has received no less than 300 applications for participation in his expedition to the Libyan Desert. Of course the great traveller can only consider very few of them. We learn further that he intends also to explore the Shari, Binue, and Ogowai Rivers and their tributaries. We hope he will succeed in accomplishing this, as it will solve many of the questions raised by Stanley's discovery of the course of the Congo. The date of his departure is not yet fixed.

SPITZBERGEN.—A very interesting series of nine maps of Spitzbergen, partly rare and little known, are published in the *Tijdschrift* of the Amsterdam Geographical Society, with an essay by Capt. de Bas, on the geographical names of Spitzbergen. The maps begin with that of Barentz's third voyage of 1596, followed by those of Gerritz, 1612; Edge, 1625; Middlehoven, 1634; Daniel, 1642; two others of 1648, and the latter half of the seventeenth century; that of Johannes van Keulen, 1710, and finally the Dunér-Nordenskjöld map of 1864.

JAPAN.—In the *Monatsbericht* of Petermann's *Mittheilungen* for February, Dr. Behm gives some information concerning recent geographical work in Japan. There is an itinerary by Dr. Schulz, of a journey he made in